Coronary Arteriovenous Malformation presenting as Acute Myocardial Infarction

Choon Ta NG, Aaron WONG, Foong-Koon CHEAH, Chi Keong CHING
The patient...

• 49 year old Male presented with
  • Chest tightness x 1 hour
  • Diaphoresis
  • Dyspnea

Past medical history of Hyperlipidaemia

Clinical examination:
  BP: 148/80mmHg
  HR: 88beats/min regular
  H:   S1S2 no murmur
ECG
<table>
<thead>
<tr>
<th>Test</th>
<th>Reference Range</th>
<th>Value</th>
<th>High Risk Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatine Kinase (U/L)</td>
<td>&lt;320</td>
<td>1881</td>
<td>676</td>
</tr>
<tr>
<td>Creatine Kinase-MB Isoenzyme (UG/L)</td>
<td>&lt;5</td>
<td>180</td>
<td>71.7</td>
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<tr>
<td>Troponin T (UG/L)</td>
<td>&lt;0.03</td>
<td>0.11</td>
<td>1.95</td>
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</tbody>
</table>
Non-ST Elevation Myocardial infarction (NSTEMI)

TIMI Risk Score: 3

(14-day Risk of Death, Recurrent MI or Urgent Revascularization: 13.2%)
Coronary Angiogram
Coronary Angiogram

LM = left main
T = thrombus
LCX = left circumflex
AVM = AV malformation
CT Angiogram

* = course of AVM

LM = Left Main coronary artery

RA = Right atrium
CT Angiogram

* = entrance of AVM at Left Main (LM) Artery

** = exit of AVM at Right Atrium (RA)
CT Angiogram

Curved plane reconstruction of LCx

→ = Narrowing of the Left Circumflex Artery due to thrombus
CT Angiogram (3D reconstruction)
What is Coronary Arteriovenous Malformation (AVM)?

- Abnormal communication between coronary arteries and one of the heart chambers or adjacent vessels

Arises from:
- Right coronary artery (55%)
- Left anterior descending artery (35%)
- Left circumflex artery

Drains into:
- Right ventricle (40%)
- Right atrium (26%)
- Pulmonary artery (17%)
- Coronary sinus (7%)
- Superior vena cava (1%)

Coronary Arteriovenous Malformation (AVM)

- **Prevalence**: Occurs in 1 in 50,000
- **Etiology**: Congenital or Acquired
- **Presentation**: Angina, dyspnea, endocarditis, acute myocardial infarction or sudden cardiac death
- **Diagnosis**: Invasive coronary angiogram is the gold standard

Yoon et al. Giant left circumflex coronary fistula. Circulation 2010
Complications of Coronary Arteriovenous Malformation

- Valvular and Endocardial Complications
- Excessive load to cardiac chambers
- Extra-cardiac complications

Mechanism of Acute Myocardial Infarction in Coronary AVM

- Thrombosis
- Rupture
- Steal phenomenon

Mechanism of Acute Myocardial Infarction

Aneurysmal Dilatation of the LM
Thrombus formation
Narrowing of the origin of LCx
Acute Myocardial Infarction
Management of coronary AVM

- Natural history of coronary AVM varies
- Most authors recommend **closure of coronary AVM** in symptomatic patients

**Surgery**
- Epicardial Ligation

**Percutaneous/Transcatheter**
- Coils
- ? Closure devices for large AVF
Management of coronary AVM

Our patient was considered **high risk** for **percutaneous intervention** in view of the proximal origin at the Left Main Coronary Artery (potentially catastrophic embolisation).

**Surgery** was deemed to be technically challenging.

**Expectant management**
- Anticoagulated with **warfarin**

Repeat CT 9 months after showed **partial resolution of thrombus**
Patient remained **asymptomatic** since on warfarin (2008) until now.
Conclusions

**Coronary AVM** is a rare condition

Varied *mode of presentation* – angina, dyspnea, endocarditis, myocardial infarction or sudden cardiac death

**Coronary angiography** is the gold standard for diagnosis

**Closure** (either surgical or percutaneous) should be considered for symptomatic patient. **Anticoagulation** can be considered in patients with unfavorable anatomy.
The **natural course** of arteriovenous malformation **varies**. If untreated, they can cause **clinical symptoms** in 19% of patients aged younger than 20 years old, and in 63% of older patients.

**Spontaneous closure** of the arteriovenous malformation secondary to spontaneous thrombosis has been reported, albeit **uncommon** (1-2%).

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¹Chirantan et al. Jounal of Thoracic Surgery 2012
“Both surgical and transcatheter approaches have similar early effectiveness, morbidity and mortality”

“The presence of a complex, large fistula, multiple connections, tortuous course, acute angulations and the presence of adjacent large coronary branch at risk of inadvertent embolisations are some contraindications for percutaneous management”

1 Neerod et al. Heart, Lung and Circulation. 2008: 17: 146-166